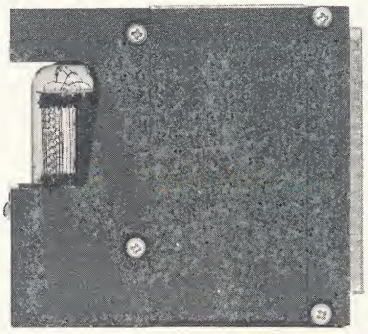
Transitron Transindicator Numerical Displays

ND Series



FEATURES

- Bright, clear, 5/8 inch numerals . . . wide viewing angle
- Rugged and reliable . . . compact modular design
- Built-in decimal point
- 8-4-2-1, 8-line or 4-line binary-coded decimal input
- 2-4-2-1, 8-line or 4-line binary-coded decimal input
- Latching or continuous display

DESCRIPTION

The Transitron Numerical Display provides a clear decimal display of binary information. This compact unit features extremely wide operating tolerances on supply voltage, temperature range and input signal level. Transindicator displays utilize silicon semiconductor circuitry throughout and are designed for use as dependable building block modules in timing, control, and computer system applications.

The ND100 series features continuous decimal display with a minimum signal voltage differential of 3 volts. The ND200 series incorporates the special feature of latching storage, making it possible to sample at any desired time the information being presented to the display, and to indicate and hold this sampled data for convenient visual observation. The latch command pulse automatically clears, decodes, and writes the information presented at the input terminals. No additional control signals are required to erase the previous display.

Electrical connections are made with standard 15 pin PC connector with 0.156" contact centers, and 1/16" board thickness. Pin 7-H has been slotted to permit polarization of the connector.

The 6-32 threaded inserts molded into the high impact Lexan† case facilitates rapid panel mounting.

CONTINUOUS DISPLAY			LATCHING DISPLAY		
Model	Case	Input *	Model	Case	Input *
ND100	A	8 line 8421	ND200 (200A)	A	8 line 8421
ND101	B	4 line 8421	ND201	B	4 line 8421
ND102	A	8 line 2421	ND202 (202A)	A	8 line 2421
ND103	B	4 line 2421	ND203	B	4 line 2421

* Other codes available on request.

† Trademark General Electric Corporation

SPECIFICATIONS — ND100 SERIES
Continuous Display Models

ND100

Output Display	5/8" high numerals, 0-1-2-3-4-5-6-7-8-9; and decimal point
Input	
Impedance	8K ohms minimum*
Code	8-line, 8-4-2-1 BCD input
BCD voltage levels	Binary "1" must be 3 to 12 volts more positive than binary "0". Binary "1" must also be 10 to 16 volts positive with respect to common return.
Blanking Control	Display blanking is achieved by lowering E_D to less than 110 volts during desired blanking interval.
Decimal Point	Current source return 0.7 MA nominal
Power Requirement	
E_D	+180 volts ± 20 V dc, 7 MA nominal
Operating Temperature	– 20 deg. C to +85 deg. C
Overall Dimensions	3" x 3¼" x 1"

ND101

Output Display	5/8" high numerals, 0-1-2-3-4-5-6-7-8-9; and decimal point
Input	
Impedance	5K ohms minimum
Code	4-line, 8-4-2-1 BCD input
BCD voltage levels	Binary "1" must be 4 to 12 volts more positive than binary "0". Binary "1" must also be 10 to 16 volts positive, with respect to common return.
Blanking Control	Display blanking is achieved by lowering E_D to less than 110 volts during desired blanking interval.
Decimal Point	Current source return 0.7 MA nominal
Power Requirement	
E_D	+180 volts ± 20 V dc, 7 MA nominal
E_C	+15 volts, 40 MA nominal
Operating Temperature	– 20 deg. C to +85 deg. C
Overall Dimensions	3" x 5" x 1"

ND102

Output Display	5/8" high numerals, 0-1-2-3-4-5-6-7-8-9; and decimal point
Input	
Impedance	8K ohms minimum*
Code	8-line, 2-4-2-1 BCD input
BCD voltage levels	Binary "1" must be 3 to 12 volts more positive than binary "0". Binary "1" must also be 10 to 16 volts positive, with respect to common return.
Blanking Control	Display blanking is achieved by lowering E_D to less than 110 volts during desired blanking interval.
Decimal Point	Current source return 0.7 MA nominal
Power Requirement	
E_D	+180 volts ± 20 V dc, 7 MA nominal
Operating Temperature	– 20 deg. C to +85 deg. C
Overall Dimensions	3" x 3¼" x 1"

ND103

Output Display	5/8" high numerals, 0-1-2-3-4-5-6-7-8-9; and decimal point
Input	
Impedance	5K ohms minimum
Code	4-line, 2-4-2-1 BCD input
BCD voltage levels	Binary "1" must be 4 to 12 volts more positive than binary "0". Binary "1" must also be 10 to 16 volts positive, with respect to common return.
Blanking Control	Display blanking is achieved by lowering E_D to less than 110 volts during desired blanking interval.
Decimal Point	Current source return 0.7 MA nominal
Power Requirement	
E_D	+180 volts ± 20 V dc, 7 MA nominal
E_C	+15 volts, 40 MA nominal
Operating Temperature	– 20 deg. C to +85 deg. C
Overall Dimensions	3" x 5" x 1"

* This impedance is the minimum effective value which will appear between each terminal pair of binary "1" and binary "0" of the drive circuitry.

SPECIFICATIONS — ND200 SERIES
Latching Display Models

ND200, 200A

Input
- Impedance . . . . . 10K ohms minimum *
- Code . . . . . 8-line, 8-4-2-1 BCD input
- BCD voltage levels . . Binary "1" must be 10 to 16 volts positive, and binary "0" must be 0 to 7 volts positive with respect to the common return. See figure 4.

Latch Command Pulses
- Internally AC coupled positive pulse
  - Amplitude . . . . . 5V minimum positive going pulse
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 to 500 μsec.
- DC coupled positive pulse
  - Amplitude . . . . . + 5V minimum
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 μsec. to ∞
  - Note: During the presence of a DC voltage level the display will be blanked. Upon returning this command signal to common, the unit will latch on to its inputs.

Blanking Control . . . . Display blanking is achieved by:
(1) Lowering E_D to less than 110V during desired blanking interval
(2) Applying DC latch command pulse

Decimal Point . . . . . Current source return 0.7MA

Power Requirements
- ‡ E_C . . . . . +15V dc, 7MA nominal (source or sink)
- E_D . . . . . + 200 ± 20V ac, 8MA nominal

Operating Temperature . – 20 deg. C to + 85 deg. C

Overall Dimensions . . 3" x 3¼" x 1"

‡ ND200A does not require 15 volt supply

ND201

Input
- Impedance . . . . . 5K ohms minimum
- Code . . . . . 4-line, 8-4-2-1 BCD input
- BCD voltage levels . . Binary "1" must be 10 to 16 volts positive, and binary "0" must be 0 to 6 volts positive with respect to the common return. See figure 4.

Latch Command Pulses
- Internally AC coupled positive pulse
  - Amplitude . . . . . 5V minimum positive going pulse
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 to 500 μsec.
- DC coupled positive pulse
  - Amplitude . . . . . + 5V minimum
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 μsec. to ∞
  - Note: During the presence of a DC voltage level the display will be blanked. Upon returning this command signal to common, the unit will latch on to its inputs.

Blanking Control . . . . Display blanking is achieved by:
(1) Lowering E_D to less than 110V during desired blanking interval
(2) Applying DC latch command pulse

Decimal Point . . . . . Current source return 0.7MA

Power Requirements
- E_C . . . . . + 15 ± 3V dc, 40MA nominal
- E_D . . . . . + 200 ± 20V dc, 7MA nominal

Operating Temperature . – 20 deg. C to + 85 deg. C

Overall Dimensions . . 3" x 5" x 1"

ND202, 202A

Input
- Impedance . . . . . 10K ohms minimum *
- Code . . . . . 8-line, 2-4-2-1 BCD input
- BCD voltage levels . . Binary "1" must be 10 to 16 volts positive, and binary "0" must be 0 to 7 volts positive with respect to the common return. See figure 4.

Latch Command Pulses
- Internally AC coupled positive pulse
  - Amplitude . . . . . 5V minimum positive going pulse
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 to 500 μsec.
- DC coupled positive pulse
  - Amplitude . . . . . + 5V minimum
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 μsec. to ∞
  - Note: During the presence of a DC voltage level the display will be blanked. Upon returning this command signal to common, the unit will latch on to its inputs.

Blanking Control . . . . Display blanking is achieved by:
(1) Lowering E_D to less than 110V during desired blanking interval
(2) Applying DC latch command pulse

Decimal Point . . . . . Current source return 0.7MA

Power Requirements
- ‡ E_C . . . . . +15V dc, 7MA nominal (source or sink)
- E_D . . . . . + 200 ± 20V dc, 8MA nominal

Operating Temperature . – 20 deg. C to + 85 deg. C

Overall Dimensions . . 3" x 3¼" x 1"

‡ ND202A does not require 15 volt supply

ND203

Input
- Impedance . . . . . 5K ohms minimum
- Code . . . . . 4-line, 2-4-2-1 BCD input
- BCD voltage levels . . Binary "1" must be 10 to 16 volts positive, and binary "0" must be 0 to 6 volts positive with respect to the common return. See figure 4.

Latch Command Pulses
- Internally AC coupled positive pulse
  - Amplitude . . . . . 5V minimum positive going pulse
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 to 500 μsec.
- DC coupled positive pulse
  - Amplitude . . . . . + 5V minimum
  - Rise time . . . . . 10 μsec. maximum
  - Fall time . . . . . 10 μsec. maximum
  - Width . . . . . 50 μsec. to ∞
  - Note: During the presence of a DC voltage level the display will be blanked. Upon returning this command signal to common, the unit will latch on to its inputs.

Blanking Control . . . . Display blanking is achieved by:
(1) Lowering E_D to less than 110V during desired blanking interval
(2) Applying DC latch command pulse

Decimal Point . . . . . Current source return 0.7MA

Power Requirements
- E_C . . . . . + 15 ± 3V dc, 40MA nominal
- E_D . . . . . + 200 ± 20V dc, 7MA nominal

Operating Temperature . – 20 deg. C to + 85 deg. C

Overall Dimensions . . 3" x 5" x 1"

* This impedance is the minimum effective value which will appear between each terminal pair of binary "1" and binary "0" of the drive circuitry.

CONTINUOUS DISPLAY BLOCK DIAGRAM

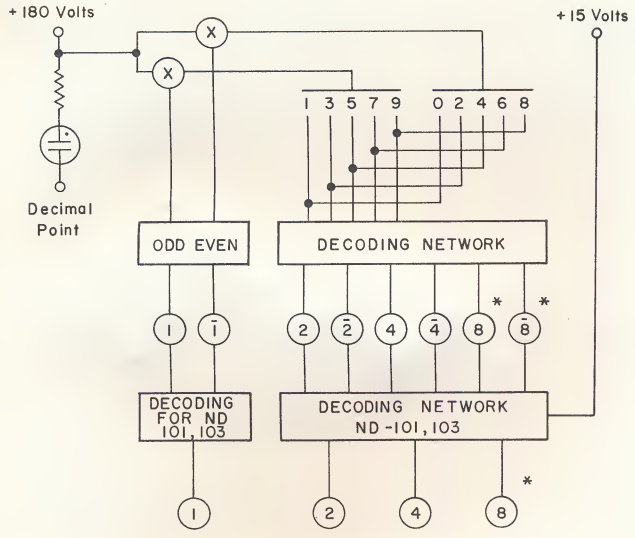


Fig. 1

Negative Logic can be accommodated by simply reversing input lines (ND100 and ND102 only).

* For ND102 and ND103 the 8 and $\overline{8}$ line will have a weight of 2 and $\overline{2}$ respectively.

LATCHING DISPLAY BLOCK DIAGRAM

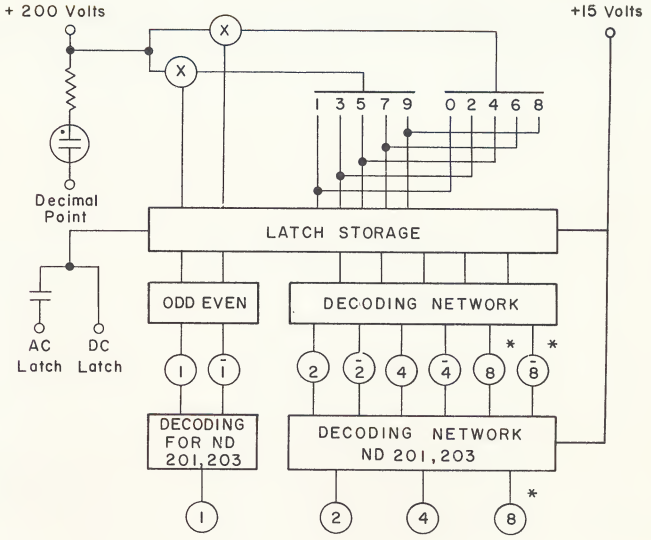


Fig. 2

Negative Logic can be accommodated by simply reversing input lines (ND200, ND200A, ND202 and ND202A only).

* For ND202 and ND203 the 8 and $\overline{8}$ line will have a weight of 2 and $\overline{2}$ respectively.

INPUT VOLTAGE LEVELS ND101, ND103

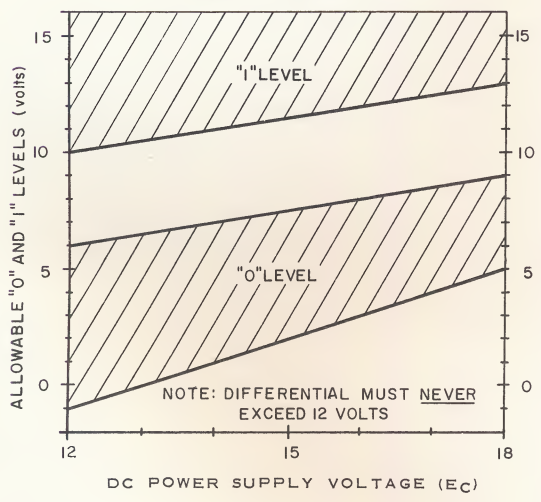


Fig. 3

Figure 3 indicates the range of acceptable input voltages for the ND101 and ND103. Operation within this range should produce satisfactory results, provided the voltage differential, "1" level minus the "0" level, does not exceed 12 volts.

INPUT VOLTAGE LEVELS ND200,A ND201 ND202,A ND203

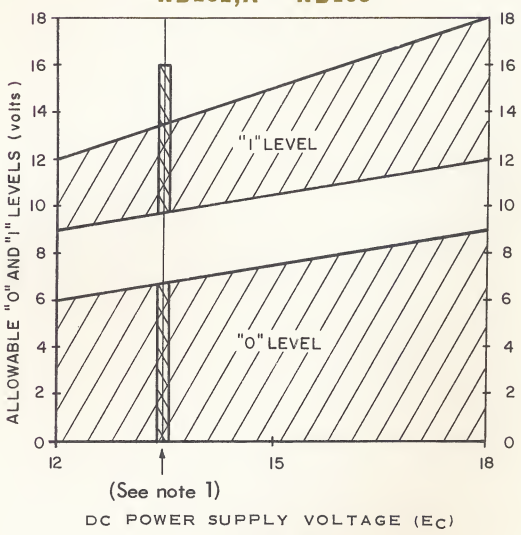


Fig. 4

Figure 4 indicates the range of acceptable input voltages for the complete ND200 family. Since the ND200A and ND202A does not require a separate 15 volt supply, the column superimposed on the curve represents the input voltage range at the nominal supply voltage.

note 1 – ND200A and ND202A input requirements.

BCD TO DECIMAL CONVERSION CHART

Display Output	8	4	2	1	$\overline{8}$	$\overline{4}$	$\overline{2}$	$\overline{1}$	2	4	2	1	$\overline{2}$	$\overline{4}$	$\overline{2}$	$\overline{1}$
0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
1	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0
2	0	0	1	0	1	1	0	1	0	0	1	0	1	1	0	1
3	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
4	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1	1
5	0	1	0	1	1	0	1	0	0	1	0	1	1	0	1	0
6	0	1	1	0	1	0	0	1	0	1	1	0	1	0	0	1
7	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0
8	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	1
9	1	0	0	1	0	1	1	0	1	1	1	1	0	0	0	0

PIN CONNECTIONS

Pin No.	ND100	ND101	ND102	ND103	ND200	ND201	ND202	ND203
1-A	+180 Volts →				+200 Volts →			
2-B	NC	NC	NC	NC	D.C. Latch Command →			
3-C	1	1	1	1	1	1	1	1
4-D	2	2	2	2	2	2	2	2
5-E	4	4	4	4	4	4	4	4
6-F	8	8	2	2	8	8	2	2
7-H	Polarization Slot →				Polarization Slot →			
8-J	NC	NC	NC	NC	A.C. Latch Command →			
9-K	NC	+15V	NC	+15V	+15V*	+15V	+15V*	+15V
10-L	Common →				Common →			
11-M	$\overline{1}$	NC	$\overline{1}$	NC	$\overline{1}$	NC	$\overline{1}$	NC
12-N	$\overline{2}$	NC	$\overline{2}$	NC	$\overline{2}$	NC	$\overline{2}$	NC
13-P	$\overline{4}$	NC	$\overline{4}$	NC	$\overline{4}$	NC	$\overline{4}$	NC
14-R	$\overline{8}$	NC	$\overline{2}$	NC	$\overline{8}$	NC	$\overline{2}$	NC
15-S	Decimal Point →				Decimal Point →			

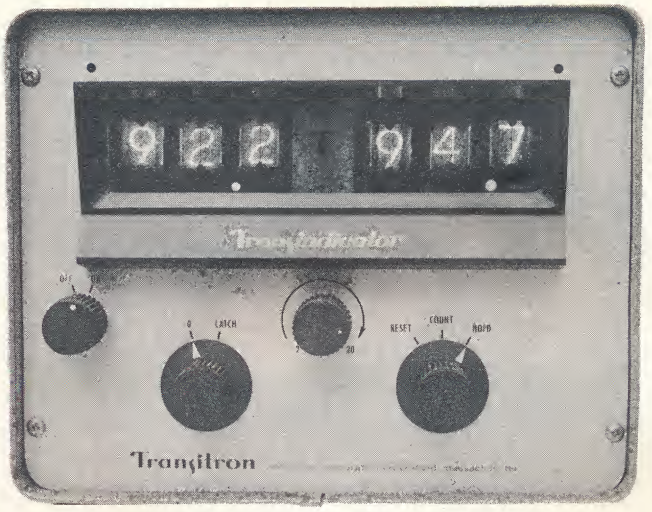
* Not required on ND200A and ND202A

APPLICATIONS

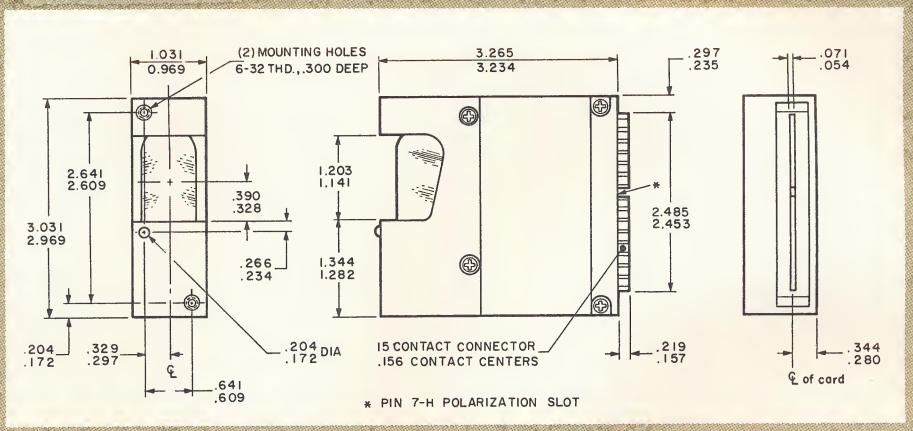
The Transindicator Numerical Displays are designed for compatibility with output levels of most flip flops and counters. Normally supplied for operation with plus 6 and 12 volt logic inputs, other inputs can be used by simply returning the common (pin 10) to a voltage other than ground. This technique is discussed in detail in the application note "Biasing Techniques for Numerical Displays."

The photograph on the right shows a numerical display assembly with bezel (optional at extra cost), assembled in a typical counter application. Note the clarity of the built-in decimal point.

Additional technical information is available by contacting the Transitron Applications Department, Wakefield, Massachusetts.



CASE STYLE A



CASE STYLE B